Manufacturing R&D Initiative Lowers Costs and Boosts Quality

With inputs from industry experts, the initiative is successfully advancing cost-reducing solid-state lighting (SSL) production innovations.

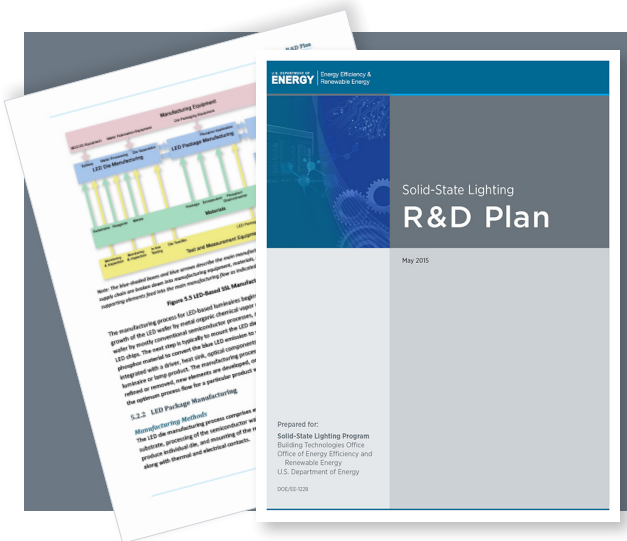
Launched in 2009, the U.S. Department of Energy's SSL Manufacturing R&D Initiative engages producers in the drive for better-performing, lower-cost solid-state lighting, while encouraging them to engineer and manufacture in the United States. Initially funded through the American Recovery and Reinvestment Act (ARRA), the effort has demonstrated that clean energy strategies and cost-shared R&D through public-private partnerships can yield impressive results. Today, the initiative continues to co-fund R&D awarded through competitive solicitations and to build the network of companies working to strengthen U.S.-based SSL production.

Veeco engineers remove a wafer carrier from a TurboDisc K465i GaN MOCVD System.
Photo courtesy of Veeco.

A Clean Energy Showpiece

Energy saved is the cleanest energy of all. With the potential to cut electricity use in half for general lighting, SSL is a clean energy showpiece. Through the Manufacturing R&D Initiative, DOE supports projects aimed at reducing the costs of SSL sources and luminaires and improving product consistency, yield, and quality. Such production improvements will facilitate SSL market growth, lowering energy bills for American businesses and consumers and reducing carbon emissions. The initiative also seeks to encourage domestic U.S. manufacturing within the SSL industry.

To date, DOE has supported 18 projects through the initiative, all competitively selected and funded on a cost-shared basis, with a total of $48 million in government investments and $51 million in contractor contributions.



The *SSL R&D Plan* not only guides government decisions on funding solicitations but, increasingly, informs private-sector investments as well. The R&D Plan reflects expert consensus on high-priority R&D opportunities—not only in the areas of core technology and product development, but also those where production innovations could significantly reduce risk, improve quality, increase yields, and lower costs in SSL manufacturing. Each year, the R&D Plan is updated based on inputs from experts at DOE roundtables and from attendees at the annual SSL R&D Workshop. In addition to profiling the current state of LED and OLED production technologies, the 2015 R&D Plan includes an overview of industry capabilities across the domestic and global supply chain and identifies areas of particular promise for U.S.-based manufacturers. To view the R&D Plan, go to ssl.energy.gov/techroadmaps.html.

Companies profiled to date in the series include 3M, Acuity Brands, Carclo Technical Plastics, Cooper Lighting, Cree, Endicott Research Group, Ephesus, EYE Lighting, Finelite, GE Lighting Solutions, Intematix, Juno Lighting Group, Kurt J. Lesker Company, LEDnovation, Lighting Science Group, Lumenetix, Lutron, NEXT Lighting, Noribachi, nTact, OLEDWorks, Philips Lumileds, PhosphorTech, Pixelligent, Plasma-Therm, Rambus, Redwood Systems, Rubicon Technology, Ruud Lighting, SAES Pure Gas, Sky Factory, Soraa, TOGGLED, Trovato Manufacturing, Universal Display Corporation, USAI Lighting, Veeco, WhiteOptics, Wide-Lite, and Xicato.

SSL ★IN AMERICA★

Stories of companies working to create and strengthen an SSL manufacturing base in the United States are featured in the *SSL in America* series on DOE's website. Companies of all sizes are profiled, with products ranging from replacement lamps and components to materials, controls, luminaires, power platforms, and manufacturing equipment. The *SSL in America* stories explore the business factors companies weigh to determine whether to manufacture overseas or in the U.S., including government incentives, labor costs, and proximity to markets. Many cite IP protection, access to quality labor and suppliers, capacity for rapid response in changing designs, lower shipping costs, and fewer delays as factors favoring U.S.-based production.

Market Successes

In determining the most promising R&D opportunities for potential funding, DOE draws on the expertise of industry and the scientific community. One central resource is the *SSL R&D Plan*, updated annually by DOE with inputs from experts at DOE roundtables and attendees at the annual SSL R&D Workshop.

Projects completed through early rounds of funding under the SSL Manufacturing R&D Initiative have already yielded innovative processes and equipment that are driving improved quality and lower costs in SSL. Notable successes include KLA-Tencor's development of the Candela 8620 inspection system, Veeco Instruments' development of the MaxBright™ multi-reactor system for metal organic chemical vapor deposition (MOCVD), and GE Lighting's development of advanced phosphor deposition methods. Projects span the value chain of SSL production, including not only process improvements but also manufacturing equipment, materials, testing, and designs for low-cost manufacturing—and encompassing the nascent field of organic LEDs (OLEDs).

Just the Beginning

As these early successes prove, investments in clean energy technologies such as solid-state lighting can bolster U.S. industrial competitiveness while also laying the foundation for greater energy security, lower energy costs, and reduced carbon footprints. To document the impacts of the fast-emerging SSL industry, DOE has created *SSL in America*, an ongoing series on the DOE SSL website profiling companies that are manufacturing SSL products here at home.

DOE invites you to follow the unfolding story of this evolving industry and the public-private efforts to foster a vibrant SSL manufacturing base in the United States. Learn more at http://energy.gov/eere/ssl/ssl-america.

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

For more information
To learn more about the DOE Solid-State Lighting Program, see ssl.energy.gov

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